INTRODUCING THE ORGANIZATION OF TRANSPORT STUDIES

Hellenic Institute of Transport: A New Era in Transport Research in Greece

Athanasios A. TSIOUTRAS
MSc Civil Engineer
Transport-Environmental Public Relations Manager
Research Vehicles Responsible Centre for Research and Technology Hellas (CERTH)
Hellenic Institute of Transport (HIT), Thessaloniki, Greece

HISTORICAL DATA– SCOPE OF SERVICES

The Hellenic Institute of Transport (HIT) was established in March 2000, as an Organization devoted to the promotion and execution of Transport research in Greece. It forms part of the National Centre for Research and Technology Hellas (CERTH). It acts as a "private status" legal entity under the supervision of the General Secretariat for Research and Technology of the Greek Ministry of Development.

The scope of services covers all areas of Transport and in particular the organization, operation, planning and development of infrastructure, standardization, economic analysis, management, vehicle technology and impact assessment of land, maritime, air, and multimodal transport services.

HIT co-operates and interacts with similar organizations and Institutes in the EU and other countries, and represents Greece in relevant international fora.

Its priority areas of activity include:
- Specialized research in the field of transport.
- Scientific support and documentation to decision makers.
- Standardization work.
- Training and dissemination actions in the field of Transport.
- Representation of Greece in international Transport Research fora.

HELLENIC INSTITUTE OF TRANSPORT

HIT's Logo

CERTH/HIT's premises in Thessaloniki, Greece

Its headquarters are in Thessaloniki, Greece, but a branch office also located in Athens since 2004. HIT is supported by approximately 70 researchers, research personnel, external experts, and University professors.

ROAD AND TRANSPORT RESEARCH IN HIT

One of the primary priorities of the H.I.T. is the development of state-of-the-art infrastructure for advanced transportation research mainly in road transport. This infrastructure is unique, not only in Greece but also at the European level. So far the research infrastructure that has been developed includes a range of innovative systems, including several research vehicles and driving simulators, a virtual reality system, a mobile van for traffic and environmental scenarios, a web portal for data management and process.

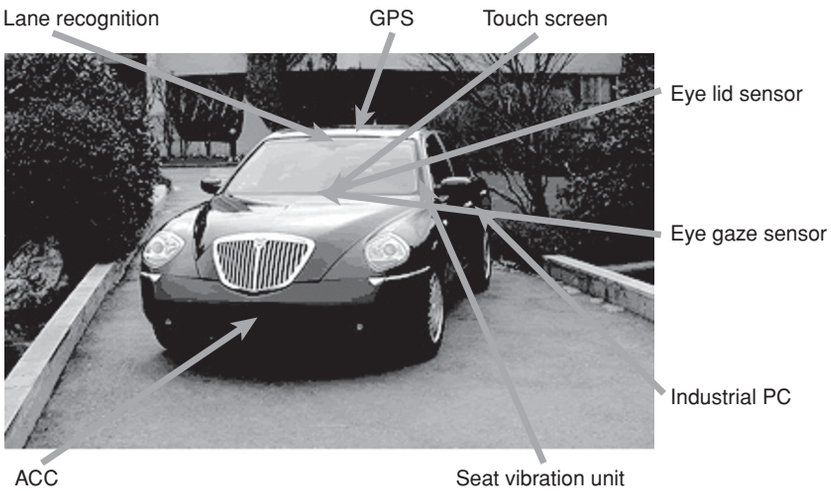
A Center of Excellence on Driving Behaviour Issues – Driving Capability Assessment

Within the framework of the operational programme COMPETITIVENESS of the Ministry of Development, **a Centre of Excellence on Driving Behaviour Issues** was created within the Hellenic Institute of Transport. The Centre is equipped with:

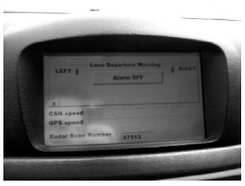
A) Research Vehicle for Driving Behaviour

The research vehicle is equipped with a front obstacle detection radar, providing information about front obstacles (distance, relative speed), a lane recognition camera, providing information about vehicle position relevant to the lane, a GPS, an eyelid sensor and software, providing information regarding eyelid movements, which are useful to estimate the level of a driver's hypovigilance, and an eye gaze sensor and software, providing information on the focus of attention of the driver at each specific time moment.

Also an electronic unit collects information such as accelerator pedal position, brake cylinder pressure, vehicle longitudinal speed



Overview of the research vehicle for driving behaviour



The touch screen

The eyelid sensor

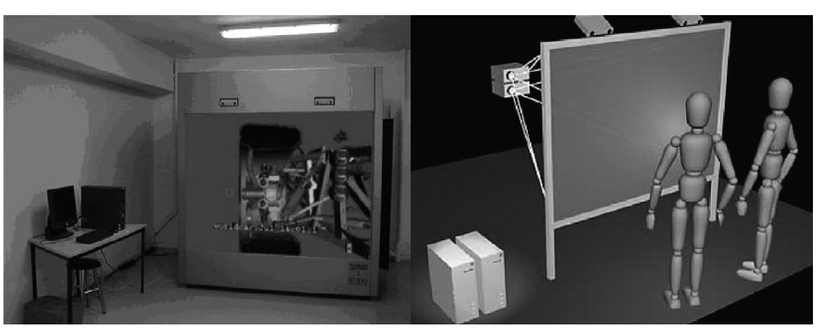
The central mirror

and acceleration, yaw rate, steering wheel angle, lights status, windscreen wiper status, external temperature, etc.

B) Virtual Reality System

This system is based in a single wall cave system and is used for the realization of structural, ergonomic and other safety and assessment analyses, which require the simulation of a series of various procedures.

The virtual reality system is used during the phase of design and revision and moreover for product marketing and exploitation, by means of their demonstration.



General overview of the HIT virtual reality system

C) Semi-Dynamic Driving Simulator

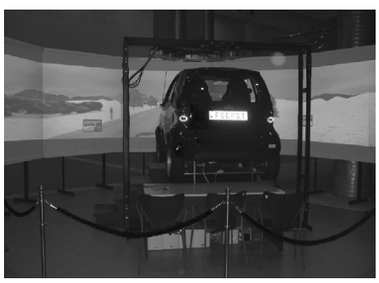
HIT's driving simulator is built around a Smart cabin equipped with sensors. The position of all control levers, windshield wipers, blinker, ignition key and light switch is transmitted to the driving computer. All operational elements, steering wheel, accelerator pedal, brake pedal, gearshift lever and handbrake lever, provide natural force reactions. The sight system includes five large-screens, each having a width of 2 m. The vibration device creates natural true vibrations of the car according to the simulated engine.

The software includes various courses (standard course, hill course, round course, highway), sight and surface conditions (nice weather, fog, rain, snow, night) and various modes (i.e. driving under various alcohol consumption rates). There are also specific software modules related to elderly driver's behaviour assessment.

The simulator is adequate to study dangerous situations, which would not be safe to test under real traffic conditions, like for example overtaking, driving under the influence of alcohol, etc.

Advanced Driver Assistance Systems

Via the above research equipment H.I.T. is involved in innovative research projects related to the assessment of driving behaviour and



General overview of the driving simulator

Driver's field of view

the development of "intelligent" driver assistance systems.

The SENSATION project (in which 46 partners from 20 countries participate and H.I.T. is the coordinator) aims at the development of micro- and nano-sensors for the monitoring of the state of vigilance of the driver, providing to him/her in-time warnings, when necessary. Based on special algorithms, the system "decides" when these parameters' values do not correspond to normal - safe driving, and automatically warns the driver to stop. Extensive research is also done, in relation to the driving behaviour of elderly or disabled drivers, as these groups need specific support (e.g., projects such as AGILE, IDEA and others).

In project PREVENT, H.I.T. is developing, among others a system that warns the driver for lateral danger driving change or when another vehicle is moving in a track that could lead to a lateral collision with the equipped vehicle.

Another relevant project is AIDE, which targets to the development of a methodology for the design of the future "intelligent vehicles".

Assessing the impacts of using clean vehicles

An important part of H.I.T.'s research work is dedicated to the impact of transport on the environment and the reduction of the negative environmental consequences of traffic flow. Indicative is the participation of H.I.T. (as coordinator) in the European project IMMACULATE, which targeted the environmental assessment of driving behaviour, as well as on the evaluation of the use of "clean" vehicles (mainly hybrid or electric) in urban areas. Within the context of the relative experiments, electric power-assisted bicycles, electric scooters and hybrid passenger cars were used and several advanced technology systems (such as various ICT systems, smart cards technology and advanced traffic management systems) were tested for their environmental performance.

Mobile Lab for Environmental and Traffic Measurement

HIT, in order to promote transportation/environmental research in Greece and to support the relevant authorities, has created a Mobile Lab for Environmental and Traffic Measurements. It has been financially supported by PEP of Central Macedonia and by the support program for Competitiveness of EPAN, in the framework of the initiative for "Excellence within the technological research". The Lab has the goal to provide the tools for collecting and analysing data, which will assist actions for the reduction of environmental pollution and traffic related problems.

The Mobile Lab includes a number of scientific environmental and traffic measurement instruments, as well as the proper supportive equipment, such as a static base which carries HORIBA CO, SO_2, NO, NO_2, O_3 & NO_x analysts on air, a sampling and a calibration HORIBA system, an air humidity and temperature measurement sen-

HIT's hybrid vehicle

Electrical moped during charging

The mobile lab

Inside the van

Wind-vane sensors

sor, a wind-gauge and a wind-vane sensor, a road profile recording georadar of high quality and analysis (900MHz sensor), several traffic parameter measurement sensors and a traffic volume measurement radar, a digital noise measurement instrument (Class 1 IEC 61672), and finally a processing and teletransmission system for the data collected by the environmental instruments and traffic measurements. An alternating current power supply generator (measurements can be done during Lab motion) is also on board.

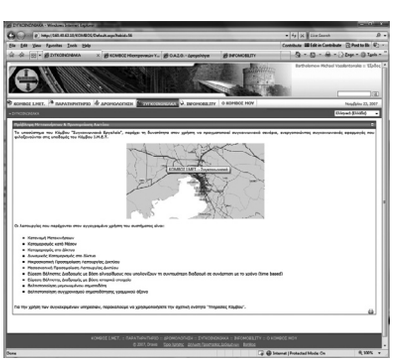
The Lab can perform the following:
- Gas emission – pollution measurements;
- Weather condition measurements (temperature, humidity, wind direction and speed);
- Sub-surface profile plotting;
- Traffic parameter registration and traffic volume measurements;
- Noise measurements.

HIT's Portal: Data Management and Process

HIT's Portal is a Traffic Data Management and Process integrated system, which is currently hosted and operated at HIT, reinforcing research activity in the Transport sector across the country of Greece.

The Portal provides electronically (through Internet) its services to the research community, to the public and private institutions that are involved with transport issues, as well as to every interested user.

The requisiteness of the referred Portal, which serves the purpose of data collection and processing, as well as the use of specialized transport-related tools for the territory of Greece, derives from the fact that not only the available information concerning the development and monitoring of the transportation system, is scattered and inadequately updated, but also that there is a low level of knowledge and usage of the specialized tools for managing and designing transportation systems by the Greek parties involved. Additionally, it should not be ignored the substantially slow rate of introducing and using innovative solutions and research outcomes in transports field.



Portal's provided services include observations, routing, use of transport tools and infomobility services, innovation dissemination and test bed.

HIT's online portal stores and provides all of its data into specialized databases either by specific functional service areas or by the portal's core main database, and whenever its necessary it interfaces with other services like GIS and the web server.

RAIL TRANSPORT

The Hellenic Institute of Transport is also active in rail transport. Indicative, HIT has carried out (on behalf of the Greek railways) the final techno-economic feasibility study for the so called "West Railway Axis of Greece", that is the expansion of today's rail network of Greece to the west of the country. Based on this study, the Ministry of Transport and the Hellenic Railways Organization (OSE) promoted the project to the 29 "High Priority Projects" of the European Union for the period 2006-2020.

Another relevant project, EURNEX, supported the EU transport policy and aimed to enhance rail system competitiveness, has mainly focused on the education and training for railway engineers and scientists, on the integration and harmonization of technical and op-

erational interfaces, on the development of common methodologies for validation, in order to ensure interoperable and safe performance, and railway research knowledge management.

MARITIME TRANSPORT

In this field H.I.T. supported the Ministry of the Aegean during the period 2002 – 2004, in its effort to reorganize and successfully confront the problems associated with the non-commercial shipping lines to the small Aegean Sea islands.

Another indicative project, TRANSLOGNET, aimed an international consortium in the corridor of the Adriatic – Ionian Seas, describing the existing environment in the field of multi-modal transportation in Greece and in relation to the European Transport Networks in the corridors of Adriatic, Ionian, and Aegean Seas.

DISSEMINATION AND TRAINING ACTIVITIES

H.I.T. is actively pursuing dissemination and training activities in all fields of its activities. Of particular interest is its campaign (part of the wider European "BOB Campaign") against drinking and driving. Preliminary results, referring to the period 2000-2004, are very encouraging, considering the reduction of positive alcohol breath tests. The Greek "BOB-Campaign" is made under the slogan "Alcohol? – Not Tonight, I am driving". It is being promoted via a wide variety of media means. Within this framework, H.I.T. has also equipped a mini-van with a "drunk driving" simulator. The mini-van is being used to demonstrate the major difference between a drunk and a sober driver, visiting public places such as schools, cinemas, clubs, etc.

Each year H.I.T. organizes Conferences, workshops, and other specific events as well as scientific and public meetings.

INTERNATIONAL NETWORKING

HIT has initiated a number of scientific exchanges and cooperations with prominent organisations in Greece (Ministries, Universities, Public Sector and Organisations, Transport Companies, Automobile Clubs). HIT has quite interesting cooperative action abroad such as many European Transport Institutes (e.g., INRETS, FHG-IVI, TNO, TOI, TRL, VTT, DLR), University of Berkeley's PATH, and "Industrial" partners such as DHL, COSCO lines, FIAT, DaimlerChrysler, Volvo, Siemens, VDO, Motorola, Porsche).

HIT is a member of ECTRI (European Conference of Transport Research Institutes), FERSI (Forum of European Road Safety Research Institutes), SETREF (South East European Transport Research Forum), ERTICO, ITP, TRB (Transport Research Board), ETSC (European Transport Safety Council).

Greek BOB-Campaign's message and the mini-van with the driving simulator